JPRS 77323

5 February 1981

USSR Report

LIFE SCIENCES

AGROTECHNOLOGY AND FOOD RESOURCES

No. 10

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. JPRS 77323	2.	3. Recipient's Accession No.

4. Title and Subtitle

USSR REPORT: LIFE SCIENCES
AGROTECHNOLOGY AND FOOD RESOURCES, No. 10

5. Report Date
5 February 1981

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Joint Publications Research Service
1000 North Glebe Road
Arlington, Virginia 22201

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

As above

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This serial report contains articles, abstracts and news items on agrotechnology, environmental degradation, food resources, industrial microbiology, plant pathology, soil technology, veterinary science, and policy and administration.

17. Document Analysis a. Descriptors

USSR
Agrotechnology
Food Resources
Industrial Microbiology
Pharmaceutical Industry

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group 02, 6A, 6C, 6F, 6H, 60

18. Availability Statement:
Unlimited Availability
Sold by NTIS
Springfield, Virginia 22161

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page)
UNCLASSIFIED

21. No. of Pages
35

22. Price

See ANSI-Z39.18

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

JPRS 77323

5 February 1981

USSR REPORT

LIFE SCIENCES

AGROTECHNOLOGY AND FOOD RESOURCES

No. 10

CONTENTS

FOOD SUPPLY

In the VASKhNIL Presidium 1

INDUSTRIAL MICROBIOLOGY

Armenian Microbiological Industry Supplies Feed Protein 5

Use of Phytopathogenic Fungi in Breeding of Agricultural Crops. 9

Work of All-Union Scientific Research Institute of Agricultural Microbiology Reviewed 13

Work of Laboratory for Microbiology and Pathology of Rodents and Insects Reviewed. 17

INDUSTRIAL TOXICOLOGY

Environmental Protection Against Harmful Chemical Compounds Discussed . 21

Measures for Improving Preservation of Pesticides Discussed 25

PLANT PATHOLOGY

Development of Effective Measures for Combating Cotton Wilt 28

Measures for Combating American White Moth Reviewed 32

[III - USSR - 21n S&T]

FOOD SUPPLY

UDC 351.773

IN THE VASKhNIL PRESIDIUM

Moscow VESTNIK SEL'SKOKHOZYAYSTVENNOY NAUKI in Russian No 9, 1980 pp 150-52

[Text] The industrialization of the Baikal-Amur main railroad zone will lead to a significant population increase in that region. Therefore, today's question is the problem of how to meet the growing needs of the population in the way of food products.

Appearing in Alma-Ata, Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee, chairman of the USSR Supreme Soviet, said, "The Baikal-Amur trunk line [BAM] is a railroad that will cut across all of Eastern Siberia and the Far East. The construction of this railroad, which will cross the Siberian land mass with its inexhaustible natural resources, is opening the way for the creation of a new, large industrial region: along this road settlements and cities will rise up, industrial complexes and mines will open - and it goes without saying that new lands will be plowed and farmed."

Following the lead set by L. I. Brezhnev, the VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin] session, which met in July 1974, obligated the scientists of the Siberian Section of VASKhNIL together with the scientific centers of Eastern Siberia and the Far East and several institutes located in other regions of the country to study the prospects for the development of agriculture in regions contiguous to the BAM.

It was planned to conduct an agro-economic survey of the land in the vicinity of the BAM, to implement complex scientific studies on development and disposition of agricultural production, for example, on development of technological cultivation of vegetables in open and closed environments, potatoes, feed crops, the production of animal husbandry products, etc.

The creation of a food base in the BAM zone is a vital problem which has been often discussed in Soviet and party organs, in planning and agricultural organizations of the RSFSR, autonomous republics and oblasts, through which the construction of the Baikal-Amur trunkline passes. The problems of developing agricultural production were discussed here at the Presidium of the All-Union Academy of Agricultural Sciences imeni V. I. Lenin. The presentation on economically based proposals for the development of agriculture in the rayons adjacent to the Baikal-Amur railroad to the year 1990 was given by BASKhNIL Academician P. L. Goncharov, chairman of the Siberian Section. The speaker noted, specifically, that a combined approach has been prescribed in establishment of the problem: 34 scientific centers were brought into the research and 19 complex support centers were created in all rayons of the BAM zone. A general plan of development and deployment of the food base was prepared and the possibility for a significant increase in the level of economic productivity of the given resources and the new lands was established.

Much attention in the program of scientific research is given to questions of creating specialized centers for the production of eggs, milk, meat, vegetables, and potatoes. In connection with this, the construction of poultry-factories and hothouses is recommended; it is suggested that new kolkhozes and subsidiary farms be created and that the strength of existing agricultural centers be expanded.

The technology for the production of vegetable crops and potatoes developed by the scientific-research centers of the Siberian section of VASKhNIL permits significant harvests of white cabbage, cucumbers, tomatoes and potatoes in the BAM region. The inclusion of planned regulation in the production satisfies the general needs of the city and worker settlement populations for vegetables and potatoes. Some agricultural products are to be shipped from rear food bases.

A paper on this topic was presented by V. R. Boyev, corresponding member of VASKhNIL and director of the Economics Institute of the Siberian Section. He spoke in detail on the creation of rear food bases, their specialization, territorial distribution, the effectiveness of efforts for their organization, and he emphasized that all efforts expended for the creation of food bases on this large territory will pay for themselves in 8-9 years.

The following people took part in the discussion on the projected work proposed by the Siberian Section of VASKhNIL: A. N. Kashtanov (Agricultural Section of the CPSU Central Committee), V. S. Shevelukha, USSR vice-minister of Agriculture, VASKhNIL Academician A. A. Sozinov, first vice-president of VASKhNIL, VASKhNIL Academician L. K. Ernst, vice-president of VASKhNIL, VASKhNIL Academicians P. I. Susidko, I. S. Shatilov, A. P. Kalashnikov, V. P. Shishkov and G. M. Buzenkov, Yu. A. Novoselov, vice-chairman of the Siberian Section of VASKhNIL, and others. The applied scientific significance of the problem under study was noted, and the organizational measures being taken by the Siberian Section of VASKhNIL on controlling the BAM zone were evaluated positively. Some critical remarks were also made and suggestions were given for improving the food base in the region. The discussion indicated that work toward controlling the land resources of the BAM had so far, been poorly developed. The rate of agricultural development in the BAM zone is somewhat behind that of the rate of production and settlement in the region. Significant lapses were noted in solving problems of environmental protection.

The VASKhNIL Presidium paid great attention to reasons for the lag in land development, to problems of incorporating finished scientific research in industry, food production, and so forth.

The positive aspects of work done by the Siberian Section of VASKhNIL in cooperation with others in establishing a production base in the BAM zone, as well as the shortcomings, were considered.

The scientists of VASKhNIL will make all possible efforts to fulfill the recommendation of Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee, chairman of the Presidium of the USSR Supreme Soviet, which was made at a meeting with members of the Irkutsk bureau of the oblast committee of the CPSU during a field trip to the eastern territories, on the requirement that industrial rayons have an agricultural base to supply meat products and vegetables in order to successfully resolve this problem.

* * *

The meeting of the VASKhNIL Presidium considered the report of the Eastern Section of VASKhNIL on fulfilling the resolution by the CPSU Central Committee and the USSR Council of Ministers, "On measures for further improvement of the effectiveness of agricultural science and on strengthening its ties with production". The following took part in the work of the Presidium: Academician of VASKhNIL A. N. Kashtanov, vice-chairman of the Agricultural Section of the CPSU Central Committee, V. S. Shevelukha, USSR Vice-Minister of Agriculture, and colleagues I. D. Ruday from the Agricultural Section of the CPSU Central Committee, E. I. Tananakin from the USSR Council of Ministers, chiefs of subsections of the USSR Ministry of Agriculture, directors and vice-directors of several institutes and others.

The accounting report was given by Corresponding Member of VASKhNIL K. U. Medeubekov, chairman of the Presidium of the Eastern Section, who remarked that the plans for scientific research in the past years of the 10th Five-Year-Plan were generally successfully completed by the institutes of the given section. Certain positive results were obtained in the work. Many of the recommendations of the scientists are incorporated into agricultural production. In the period 1977-79 the results of 222 scientific developments with an economic effect of approximately 90 million rubles were implemented.

The speaker discussed in detail the shortcomings of scientific-organizational activity on the part of the institutes in this section and ways to overcome them. In recent years there have been few new grain crop strains developed, especially for the virgin rayons of Kazakhstan; research in the field of animal husbandry is not sufficient; the productivity of the experimental farms of the institutes is low; and the preparation of scientific specialists is weak.

Much emphasis was given to the question of the future development of scientific research in the region.

Academician of VASKhNIL V. P. Shishkov spoke about results of stocktaking of the Eastern Section's activities. The commission familiarized itself with the work of the Presidium of the Eastern Section of VASKhNIL, eight of its institutes, and several experimental farms. The experimental parts of the farms and the results of incorporating certain developments in the sovkhozes were observed. The commission's opinion on the activity of the institutions was made known to the people involved. The analysis of the results of this observation led the commission to recommend to the Presidium of VASKhNIL--keeping in mind the aforementioned remarks--that the activities of the Eastern Section be approved. The conclusions of the commission were discussed in a general meeting of the Presidium of the Eastern Section with the workers of the Central Committee of the Comparty and the Kazakh SSR Ministry of Agriculture.

The following people participated in the discussion of the activities of the Eastern Section: V. S. Shevelukha, USSR vice-minister of Agriculture, A. M. Zhiryakov, vice-director of the All-Soviet Institute of Animal Husbandry, Corresponding Member of VASKhNIL I. A. Abugaliyev, director of the Kazakh Scientific Research Institute of Farming and A. K. Il'ichev, chairman of the Council on the Prospects for Developing Systems of Agriculture of VASKhNIL. Having positively evaluated the activity of the Section, the speakers pointed out to the leaders of the Eastern Section the recessity of increasing efforts for preparing scientific personnel and for immediate measures to correct shortcomings in the work of the experimental farms.

President and Academician of VASKhNIL P. P. Vavilov made the closing statement, emphasizing the importance and immediacy of the discussions on this problem. The president said that the work of the section in the past four years should be evaluated positively. It is necessary to concentrate the efforts of the scientific research institutes of the Eastern Section in order to solve such important questions of the region as the intensification of animal husbandry, the creation of a solid food base, the future increase of grain production, research on the development of the solonetz and the more effective use of pastures.

Research on the problem of supplying the scientific centers with modern research equipment should be paramount in the considerations of the leaders of the Eastern Section of VASKhNIL. In relation to this, measures should be taken for the completion of selection centers.

In the accepted resolution, the activity of the Eastern Section of VASKhNIL was positively evaluated and concrete suggestions on the part of the Presidium to the institutions of the Eastern Section for the improvement of activities leading to the fulfilment of the 10th Five-Year-Plan and measures for realizing the goals set by the CPSU Central Committee and the USSR Council of Ministers "On measures for further improvement of the effectiveness of agricultural science and on strengthening its ties with production" were made.

COPYRIGHT: Izdatel'stvo "Kolos", "Vestnik sel'skokhozyaystvennoy nauki", 1980
[503-9233]

9233
CSO: 1840

INDUSTRIAL MICROBIOLOGY

ARMENIAN MICROBIOLOGICAL INDUSTRY SUPPLIES FEED PROTEIN

Yerevan KOMMUNIST in Russian 4 Oct 80 p 2

[Article by Armenian SSR Academy of Sciences Corresponding Member E. Afrikyan: "Microbiology: The Reserves of the Feed Base"]

[Text] The feed problem is mainly one of acquiring proteins and their components--amino acids, which are the basis of the vital activities of living organisms. Today, microbiology possesses better possibilities than any other science for arriving at the most effective solution to the problem of producing these products industrially.

Our country was the first in the world to create major production capacities for microbiological production of yeast protein-vitamin concentrates at a quantity of hundreds of thousands of tons annually. Successes have been achieved in microbiological acquisition of the most important protein compounds--amino acids, used as feed and food additives. Special attention is devoted in this case to production of lysine, an essential amino acid, use of which in animal husbandry promotes significant weight gain and economization of feed supplies. The first high-output plant for microbiological production of lysine was created in Armenia. The accumulated experience went a long way to promote successful development of this sector in our country.

Presently the technical-economic advantages of microbiological acquisition of feed and food products on an industrial basis elicit no doubts at all. The main task is to find cheap and available raw materials to be used in cultivation of microorganisms, mainly sources of carbon and nitrogen nutrition. The nitrogen problem may be said to be solved to a significant extent, inasmuch as ammonium salts, nitrates, and other nitrogenous compounds are readily available, being naturally abundant and produced in large quantities by chemical industry.

The problem of finding cheap sources of carbon as a source of nutrition and energy in cultivation of microorganisms was found to be relatively complex. Use of molasses, corn extract, and other raw materials of plant and animal origin is limited, and it is not economical. Use of hydrocarbons (natural gas, paraffins, and so on) has also become unprofitable in connection with the growing cost of petroleum and depletion of its reserves.

This is why scientists have directed their efforts at acquiring and using forms of microorganisms which could be grown with other carbon nutrients or with cheaper sources of energy. Special attention has been attached in this case to finding so-called renewable raw materials, the reserves of which may be practically inexhaustible on our planet, in distinction from petroleum products.

One of the promising sources of acquisition of feed and food products is phototrophic microorganisms having the capability for utilizing carbon dioxide to form a large quantity of protein-vitamin biomass. Feed products finding successful uses in animal husbandry are now being produced in our country and in many other countries with the help of *Chlorella* and other algae.

Much attention is being devoted to hydrogen bacteria grown in a mixture of hydrogen, oxygen, and carbon dioxide and producing rich protein biomass. Experimental industrial production operations employing hydrogen bacteria have already been created in a number of countries. Tests of biomass produced by these bacteria demonstrated their high food value. The figures demonstrate the high profitability of such production operations: A minimum of 1 gm dry biomass containing not less than 50 percent complete protein may be acquired from an equivalent of 10 liters of gas mixture.

Our republic has real possibilities for organizing a scientific research and production program in these directions.

The Institute of Agrochemical Problems and Hydroponics of the Armenian SSR Academy of Sciences has obtained valuable results in *Chlorella* cultivation. The republic's Council of Ministers has made plans to create facilities in our republic for cultivation of algae on open ground, and for their use in animal husbandry.

In addition to algae, phototrophic bacteria, which have the ability to form proteins and other organic compounds with the energy of light and carbon dioxide, are a promising group of microorganisms in the production of protein-vitamin products. The biomass of these bacteria is about 60 percent protein and 10 percent fat, and it is rich in vitamins. In contrast to the situation with algae, the cell membrane of these bacteria is not as hard, and the nutrients of these bacteria are assimilated by animals incomparably better.

New, promising phototrophic bacteria have been isolated and studied at the Institute of Microbiology of the Republic's Academy of Sciences. Conditions for their cultivation, which result in a high yield of protein-vitamin biomass and require the use of carbonated mineral water, have been developed.

Tests of the food value of experimental preparations of protein-vitamin concentrates made by phototrophic bacteria, performed under the guidance of Armenian SSR Academy of Sciences Academician S. Karapetyan, demonstrated the high effectiveness of this concentrate in poultry raising.

Organization of the production of protein-vitamin products with phototrophic bacteria is extremely important and especially promising in the Armenian SSR, which is distinguished by a large number of sunny days in the year, and high intensity of solar radiation. The Armenian SSR possesses a large number of carbonated mineral springs, including hot springs, the water of which may be used successfully without additional heating, which would significantly reduce energy outlays in such production. *Chlorella* growing devices have been developed in our country by the All-Union Scientific Research Institute of Bioengineering. These devices may be used successfully to organize production of protein-vitamin products in the republic using phototrophic bacteria.

There are other resources as well. I am referring to using spent hydrogen at the "Nairit" Association. According to preliminary estimates about 3,000-5,000 tons of hydrogen bacteria containing not less than 50-60 percent protein can be obtained annually.

Acquisition of microbial protein as well as ethanol, glucose, and other valuable products using paper pulp wastes is extremely promising and important.

Starch is believed to be a promising resource for microbiological production of dietary and feed protein. Estimates show that production of microbial protein by direct conversion of a quantity of starch equivalent to 1 hectare of potatoes results in 10 times more protein than that provided by the same area of wheat. The yield of protein per planted hectare would be 20 times greater than that from wheat when plants having a richer starch content are used--cassava for example, which contains 30-35 percent starch. Specialists in a number of countries view starch as the most realistic raw material for microbiological production of not only feed but also dietary protein. Moreover, raw material resources such as paper pulp wastes and starch are renewable, and practically inexhaustible.

Work on so-called "dry fermentation", or growth of microorganisms on solid substrates, has extremely important practical significance in this regard. This process can halve the energy outlays of existing microbiological production operations.

The Institute of Microbiology of the republic's Academy of Sciences has been working many years on the problems of using agricultural and industrial wastes in microbiological production of protein-vitamin concentrates. The research results have shown that we have large quantities of waste in farming and in chemical and food industry that may serve as a good raw material for microbiological acquisition of feed protein. Such raw material sources can include the cellulose wastes of crop production (for example straw, grape cuttings, and the wastes of geranium production and truck farming), other production operations, dairy industry, cheesemaking, and winemaking. Especially interesting are the results of research conducted by institute colleagues establishing the possibility for using the wastes of the republic's chemical production operations for cultivation of microorganisms and acquisition of protein-vitamin concentrates from them. These data permit recommendation of microbiological methods not only for acquisition of feed preparations but also simultaneously for the purposes of utilizing and purifying the organic wastes of a number of chemical enterprises, with the hope of creating wasteless production operations.

This is not the first time any of the problems listed above have been brought up for discussion, but unfortunately their solution is being delayed. In my opinion this attests to our republic's understatement of the possibilities of microbiology and associated subdivisions of applied biochemistry, genetics, and technological science in solution of major national economic problems. Today, microbiology shares with other sciences a major role in solving the most important problems of power engineering, of protecting the environment, of industrializing food acquisition, of intensifying different sectors of industry, and many other problems.

The need for practical introduction of the achievements of microbiology in feed acquisition makes it suitable to build experimental production facilities in the Armenian SSR at a number of industrial enterprises, and to utilize their material-technical base and their specialists.

Strengthening and developing the production-technological and personnel base of the Armenian SSR Academy of Sciences Institute of Microbiology is all the more urgent. This must be done so that we could prepare the raw data needed in the planning and construction of such facilities, and in development of microbiological production of feed and food products in the Armenian SSR.

Microbiological science and industry make up a powerful reserve for solving the republic's feed problem and reinforcing its feed base.
[505-11004]

11004
CSO: 1840

UDC 632.937.14/.15

USE OF PHYTOPATHOGENIC FUNGI IN BREEDING OF AGRICULTURAL CROPS

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 37-38

[Article by A.V. Khotyanovich, head of Laboratory for Technical Microbiology: "An Effective Breeding Instrument"]

[Text] The past two decades have been characterized by the extensive use of various microbe preparations or the products of the vital activity of microorganisms in animal husbandry, farming, in the processing of plant raw materials and in protecting plants and animals against diseases and invasion by harmful insects. The isolation of new and productive microorganisms, the development of technologies that are based upon modern scientific and engineering achievements and the extremely high effectiveness of microbe preparations have led to the creation of the microbiological industry, which is playing a substantial role in the country's economy.

One of the most important trends in agricultural microbiology is that of using preparations of phytopathogenic fungi for the purpose of creating IIF's [iskusstvennyy infektsionnyy fon; artificial infectious background], which in turn are employed for the breeding of hardy varieties which are immune to the principal diseases found on the territory of the USSR.

The vital nature of this work increases in connection with farming specialization and intensification. The trend towards a single-crop system, the cultivation of 1-2 varieties over large areas, the ability of harmful organisms to remain preserved in the soil for an extended period of time and the constancy and variability of a pathogen in terms of its virulence and aggressiveness -- all of these factors create the prerequisites for the formation of those microbiocoenoses considered to be harmful to crop husbandry. Of the three practicable methods for combating plant diseases -- agrotechnical, chemical and the cultivation of resistant (hardy) varieties -- the latter is considered to be the most efficient.

Over a period of many years, the Laboratory for Technical Microbiology has been developing a technology for the preparation and use of preparations of phytopathogenic fungi, for use in the creation of IIF's -- to be used for breeding plants having a resistance to Verticillium dahliae, Helminthosporium sativum, Fusarium culmorum, Sclerotinia trikoliorum and Trielaviopsis basicola. All of these fungi live in the soil and are characterized by a high morphological variability. Their virulence changes constantly depending upon various abiotic and biotic factors (among which the principal role is played by the variety under cultivation).

Using cotton and V. dahliae as an example, a clear differentiation of the pathogen into two physiological strains, according to the characteristic of virulence to different varieties (V.I. Popov, 1962), is traced in plantings of the crop. The prolonged cultivation of one and the same variety leads to a predominance of a particular strain in the fungus population, precisely the one which is most virulent to it. Over the course of several years, this new strain can become concentrated and subsequently result in the mass infection of a newly created variety. As an illustration of this condition, we can cite the complete loss of resistance in the 108-F variety (formerly a very good one) and also the obvious build-up in the disease rate for wilt in the new varieties of the Tashkent series. In other words, a requirement exists for a permanent change in varieties, with the breeding process for resistance to wilt being carried out on a constant basis. Under the modern conditions imposed by intensive cotton growing operations, the frequency for such such changes in all probability will not exceed 7-10 years. To a certain degree, everything stated above also applies to other agricultural crops and pathogens which inhabit the soil.

For the successful breeding of resistant varieties, a plant breeder must have at his disposal a phytopathogen preparation for a definite strain and one characterized by a high level of activity and suitable for transporting, storage and use. The scale of the breeding work being carried out at the present time requires the production of a considerable quantity of infectious material, for use in the creation of IIF's on sites consisting of tens of hectares and this requires the development of an industrial technology for the production of phytopathogenic fungi.

The idea of using IIF's is by no means a new one. It was successfully introduced roughly about 50 years ago by A.I. Solov'yeva in connection with the cultivation of V. dahliae in grain. However, the preparation obtained possessed relatively low activity and required a great expenditure of materials. Moreover, it was not always homogeneous in nature.

A technology was developed in our laboratory for producing infectious material, based upon more virulent strains of V. dahliae, through the deep cultivation of a fungus in liquid culture mediums containing potato pulp, mineral nitrogen, phosphorus and other elements. The fermentation takes place over a period of 96-110 hours, at a temperature of 24-26° and with continuous mixing and aeration with sterile air. The formation of the microsclerotium (special purpose product) commences when the culture is 60-72 hours old. Once the cultivation process has been completed, the fermented liquid is separated out and the solid phase, consisting of the microsclerotium (50 percent), conidium and mycelium, is dried out at a temperature of 45°, crushed and packaged in 5-10 kilogram kraft bags. The yield of dry preparation is 15-16 kilograms per cubic meter of culture medium containing 30 kilograms of dry pulp. One gram of the standard preparation contains 8-10 million microsclerotium.

Laboratory and vegetative tests of the preparation have revealed its high pathogenicity with regard to cotton. During field tests, it was necessary to apply only 30-40 kilograms of the preparation per hectare in order to obtain 75-95 percent infection of the cotton plants by wilt. At the present time, it is being employed extensively for creating IIF's at breeding and scientific institutes in the country's cotton growing regions.

At the Andizhan Branch of SoyuzNIKhI (All-Union Scientific Research Institute of Cotton Growing), a background was created on an area of 3 hectares and during the next 1-2 years it will be increased to 6-8 hectares. A study is being carried out on the possibility of organizing a background on saline soils in the Turkmen SSR on 0.25 hectares (Scientific Research Institute of Farming). The preparation is being used successfully in a number of scientific and breeding institutes as a constantly active factor in the selection of resistant varieties, lines and hybrids of cotton.

The practical utilization of the preparation has shown that it accelerates the process of breeding resistant varieties of cotton by 3-5 years (A.N. Tribunskiy, 1979).

During the past few years, an increase has taken place in the spread of and degree of harm caused by root rot in grain crops. The principal causative agents for root rot are the fungi from the species Fusarium and Helminthosporium. A technology has been developed at the institute for producing an infectious outbreak of these phytopathogens. Similar to V. dahliae, F. culmorum is cultivated using the deep method and in a medium containing glycerine, urea and citric acid. The final product is the macro-conidium of this fungus, constituting 90-95 percent of the entire biomass obtained. The Fusarium micro-conidium lose their viability during separation and especially during the drying out process. In this regard, a structure was developed for the protective ingredients which practically eliminates the destruction of the macro-conidium. The preparation obtained is characterized by high virulence and stability during storage.

Methods are presently being developed for its use in the creation of IIF's. Taking into account the morphological variability of Fusarium, selective mediums were developed for isolating this pathogen and for applying it to the soil in the form of a fungus preparation. It turned out that the introduction of the pathogen into the soil is dependent upon its resistance, determined by a complex of biological and physical properties. It should be emphasized that the "acclimatization" and activity of phytopathogenic fungi are greatly dependent upon the biological buffering of the soils. This is of special importance when organizing IIF's for all of the phytopathogenic microorganisms.

The most stable forms of fungi are resting structures -- micro-sclerotium, macro-conidium and chlamydospores. The deep method of cultivation does not always ensure that they will be obtained. In this regard, a surface method of cultivation in solid culture mediums is employed for some phytopathogens. Thus, H. sativum is cultivated in a medium consisting of sunflower husks (substratum-carrier), enriched with starch or plant or animal fat, with the conidium yield being approximately 25 percent of the weight of the fungus culture together with the inert material of the carrier. Similar developments were noted in the cultivation of T. basicola and S. trifoliorum. These pathogens are extremely sensitive to the structure of the culture medium and especially to the sources of nitrogen. They are cultivated in millet or other porous materials that have been impregnated by industrially produced protein hydrolyzates, yeast extract or other sources of biologically active substances.

A study is underway at the present time on the conditions for using the preparation T. basicola for evaluating the resistance of fine-fibred cotton varieties to black root rot (U. Rasulov, V. Tagirova, 1976). At the NIISKh Severo-Zapada [Scientific Research Institute of Agriculture for the Northwest], an IIF was created using the preparation S. trifoliorum. During the very first year of its functioning, evaluations were obtained on more than 200 variety-specimens and hybrids of clover with regard to such a terrible disease as cancer (A.N. Nesterov, 1979).

The examples cited reveal that the use of preparations of phytopathogenic fungi serves as an effective instrument for the accelerated breeding of various agricultural crops for resistance to many diseases.

The use of preparations of phytopathogenic fungi holds great promise for the future for evaluating strains being received at Gossortoset' [State Strain Testing Network], for comprehensive approval in terms of their resistance to definite pathogens. Experimental work on cotton wilt is being carried out at inspectorates in the Kazakh and Azerbaijan SSR's; experiments have commenced on the creation of an IIF for root rot in grain crops at the Gossortoset' in Pskovskaya Oblast.

The preparations of phytopathogenic fungi are being employed successfully not only for evaluating resistance and the permanent selection of new varieties, lines and hybrids, but also for determining the effectiveness of the agrotechnical and chemical methods for combating diseases (SoyuzNIKhI). The high and controlled degree of diseases in plants makes it possible to determine in a reliable manner the effectiveness of the methods developed for combating diseases caused by phytopathogens residing in the soil.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

WORK OF ALL-UNION SCIENTIFIC RESEARCH INSTITUTE OF AGRICULTURAL MICROBIOLOGY REVIEWED

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 30-32

[Article by O.A. Berestetskiy, director of All-Union Scientific Research Institute of Agricultural Microbiology: "Contribution by Scientists"]

[Text] The All-Union Scientific Research Institute of Agricultural Microbiology is celebrating its 50th anniversary. During these years the former branch for agricultural microbiology of the State Institute of Experimental Agronomy was transformed into a large-scale and orderly coordination center.

Fundamental studies in the field of biological fixation of nitrogen and the development of methods for its effective use in farming, the creation of methods for controlling microbiological processes in the soil and microbe preparations, in order to raise its fertility and protect agricultural plants against pests and diseases, microbiological methods for processing agricultural products and raising the nutritional value of feed for livestock husbandry -- these are the principal trends of the science and production activities of VNIISKhM [All-Union Scientific Research Institute of Agricultural Microbiology]. Well known scientists worked at the institute: academicians S.P. Kostychev, V.L. Isachenko, G.A. Nadson, V.L. Omelyanskiy, Ye.N. Mishustin, I.I. Samoylov, doctors of science S.S. Merezhkovskiy, V.P. Izrail'skiy, G.L. Seliber, M.P. Korsakova, L.L. Garder, M.I. Prokhorov and others.

The first director of the institute, upon whose initiative the All-Union Scientific Research Institute of Microbiology became a part of VASKhNIL [All-Union Academy of Agricultural Sciences imeni V.I. Lenin] in May 1930, was Academician S.P. Kostychev. It was under his direction that M.N. Korsakova, O.G. Shul'gina, N.M. Lazarev and other microbiologists carried out extensive and unique studies, for the country as a whole, with regard to the biodynamics of various soils and the structure and activity in them of soil microflora. This work formed the basis for further study of the role played by microorganisms in soil fertility and in the development of practical methods for controlling the microbiological processes in the soil.

As the result of a study carried out on the principal communities of soil microorganisms, which participate in the synthesis-disintegration processes for an organic substance in plant nutrition, the bacterial preparation AMB [Group B autochtonous microflora] was created and a method for the efficient use of peat-hotbed soil was proposed which makes it possible to obtain earlier vegetable products and an increase in yield of 15-20 percent. More than 200,000 tons of AMB soil are being employed annually in vegetable production operations, with the farms obtaining approximately 26 rubles of additional income from each ton.

Basic studies were carried out at the institute on the microbiological transformation of nitrogen in sod-podzolic soils in the nonchernozem zone. A study was undertaken of the peculiarities of the processes of nitrogen immobilization-mineralization in soil and fertilizers, for different levels of fertility, and their importance for nitrogen nutrition in the ontogenesis of various agricultural crops was established. As a result, practical methods for the correct use of organic and nitrogen fertilizers were developed jointly with scientific institutions. Their use on an area in excess of 3 million hectares furnishes an economic savings of approximately 10 million rubles. This represents a worthy contribution by the institute's scientists towards agricultural development in the nonchernozem zone of the RSFSR. The proposed methods are promoting a solution for another very important task -- protecting the environment against contamination.

Extensive studies are being carried out on the effect of soil microflora on the phosphorus nutrition of plants. Appropriate methods have been recommended and soil microorganisms have been isolated and identified which are capable of actively dissolving the Ca, Fe and Al phosphates, which are almost inaccessible to the plants, and also organisms which decompose the organic compounds of phosphorus, including phytin, which is very widely distributed and which is also almost inaccessible to the plants. Microorganisms which dissolve the Fe and Al phosphates have been isolated and described for the very first time.

Commencing with its initial years of existence, the institute has occupied leading positions in the development of the theoretical principles and practical methods for the intensive use of biological nitrogen in agriculture. The ecology and physiology of nitrogen-fixing microorganisms were studied and the largest collection of rhizobium in the country was created. This collection was included in the world catalogue entitled "Rhizobium." Genetic methods were developed for breeding rhizobium having a raised nitrogen-fixing activity.

A new and highly effective preparation was obtained for nitrogen-fixing rhizobium -- rhizotorfin -- to be used for raising the yields of pulse crops. In terms of its effectiveness, it surpasses similar foreign preparations. An industrial technology for its production was introduced into operations at plants of USSR Glavmikrobioprom [Main Administration for Microbiological Industry] and in 1979 sufficient rhizotorfin portions for 750,000 hectares were produced. The use of this preparation furnishes 2-4 additional quintals of soybean grain and lupine per hectare, it increases the yield of clover and alfalfa hay by 6-10 quintals per hectare and it raises the protein content of the yield by 3-5 percent.

The work carried out by the institute's scientists on the effect of various agricultural plants on the microflora of soils made a substantial contribution towards the creation of the theoretical principles of crop rotation plans, under the conditions imposed by intensified farming.

Unique ecological methods were proposed for studying phytopathogenic fungi in the soil and their interrelationships with microflora. This laid the groundwork for developing agrotechnical measures for combating cotton wilt.

A study of the ecology and physiology of soil phytopathogenics provided the foundation for the development of a technology for producing preparations of phytopathogenic fungi, for use in the creation of artificial infectious backgrounds in the breeding of plants for stability against diseases. The institute organized the mass production of such preparations as vertex, tilipsin, fusarine and others, for use in the accelerated breeding of cotton and grain crops for resistance against wilt and root rot. At the present time, the country's breeding centers are fully supplied with vertox. According to data furnished by breeding institutes in Central Asia, its use is reducing the amount of time required to breed wilt resistant varieties of cotton by 3-5 years. Thus, the breeding of such wilt resistant varieties, involving the use of infectious backgrounds and based upon standard microbiological preparations, has been carried out in our country for the very first time.

The effect of pesticides on microbiological processes has been established and methods have been proposed for controlling them for the self-cleaning of soil. Studies have been carried out on the methods for carrying out the microbiological degradation of triazine herbicides and on the methods for accelerating their detoxication. This work is of great importance with regard to solving the problems associated with environmental protection.

The institute was the first to develop microbiological methods for combating harmful rodents and insects. These research trends are discussed in the article by N.V. Kandybin.

Our scientists were also the first to develop new microbe preparations possessing characteristics of repellent, anti-fidant, pseudo-hormonal and other actions, which cause no harm to useful fauna and flora and do not disrupt the biocoenotic links in nature.

The institute is a pioneer in the field of using microorganisms in the industrial processing of bast-fibre plants. A preparation which we created, pectolitin, accelerates the wetting process for flax and hemp by an average of 25 percent, with the fibre yield increasing from 9 to 11 percent.

A great contribution was made with regard to solving a very important national economic problem -- raising the nutritional value of feed preserved for livestock husbandry operations. A technology was introduced for preparing and using silage ferment. At the present time, it is being produced by more than 60 veterinary laboratories, biological shops and plants of Glavmikrobioprom. The ensiling of 52 million tons of plant raw material is ensured.

In 1930, the Moscow Bacterial-Agronomic Station was added to the institute and subsequently it became the Moscow department of the institute. Studies were carried out in this department on the role played by soil microorganisms in the phosphorus and sulphur cycles (K.I. Rudakov), on the microbiological processes in the transformation of the principal plant nutrients (Ye.N. Mishustin) and on the physiological-biochemical peculiarities of variability and lysogenesis of rhizobium (V.P. Izrail'skiy and others). Successful studies were undertaken on bacteriosis, mycosis and cancer in plants (etiology of sickness was studied and measures were developed for combating agricultural crop diseases). In 1968, this department provided the foundation for organizing the All-Union Scientific Research Institute of Bacterial Preparations and Microbiological Agents for Protecting Plants (VNII Bakpreparatov).

During the war years, special attention was given at VNIISKhM to the introduction into agricultural production of developments aimed at increasing and preserving the crops. The institute's scientists overcame the tremendous difficulties posed by the wartime conditions and performed in a selfless manner in blockaded Leningrad and at Falenki in Kirovskaya Oblast, to which point the institute was evacuated. In Moscow, Siberia and Central Asia, they participated in the production and application of bacterial preparations -- nitragin and microbiological agents for the protection of plants. Work was carried out in connection with the breeding of highly active strains of microorganisms for the production of bacterial preparations.

At the present time, VNIISKhM is a leading coordination center for the country. It also carries out extensive international collaboration, particularly within the CEMA framework.

The institute plays a great role in the training of highly skilled specialists and scientific workers. It is the only institute in the USSR which trains scientific cadres for agricultural microbiology. Specialists who have completed their post-graduate work and apprentices from the institute perform successfully at scientific research institutes in the union republics and also in a number of socialist and developing countries. All-union school seminars, courses for improving skills and coordination and other conferences on agricultural microbiology are conducted at the institute on a systematic basis.

The scientific potential of the institute makes it possible to solve very important problems of a fundamental and applied nature and on a modern level. For the primary semi-production preparation of new technologies for bacterial preparations and their testing, the institute has an experimental production enterprise in the city of Kolpino and a soil microbiology division for the southern zone -- in the Crimea.

The VNIISKhM publicizes the scientific achievements extensively in the press and on radio and television. It is a constant participant in the USSR VDNKh [Exhibition of Achievements of the National Economy of the USSR] and it has frequently been awarded diplomas and medals for its exhibits. Our scientists prepared and published more than 20 monographs and 48 issues of collections of scientific works. We are furnishing a great amount of scientific-methodological assistance to kolkhozes, sovkhozes and various institutes throughout the country.

In celebrating their 50th anniversary, the institute's workers are directing their efforts towards successfully carrying out the decisions handed down during the 25th CPSU Congress and preparing for the 26th party congress in a worthy manner. Having joined in the socialist competition in honor of the forthcoming congress, the institute has undertaken the obligation of raising the annual economic savings to be realized from the introduction of finished developments into agricultural production to 25 million rubles.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980.
[509-7026]

7026
CSO: 1840

WORK OF LABORATORY FOR MICROBIOLOGY AND PATHOLOGY OF RODENTS AND INSECTS REVIEWED

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 33-35

[Article by N.V. Kandybin, professor and head of Laboratory for Microbiology and Pathology of Rodents and Insects: "In the Plant Protection Service"]

[Text] As a science, agricultural microbiology serves all branches of agricultural production, including the protection of plants. It is known that various diseases and pests inflict great harm upon crop husbandry operations. In order to combat these pests and diseases using the microbiological method, a thorough and complete study must be undertaken of the microorganisms involved and efficient methods developed for combating them.

As early as 1891, a bacteriological laboratory was created within the Department of Farming and State Property, the task of which included a search for rat and mice destroying bacteria and the development of methods for employing them. The need for creating such a laboratory was dictated by periodic and mass flare-ups in the propagation and sharp increases in the numbers of such rodents and the harm caused by them in various regions of Russia. The function of this laboratory was subsequently expanded to include studies on the microbiology and epizootology of insects, wine-making, nitrogen-fixation and so forth. In the final analysis, this laboratory has become a component part of the new institute.

One of the principal components of our institute is a laboratory for the microbiology and pathology of rodents and insects. Fruitful work is being performed by such well known scientists as A.Ye. Feoktistov, B.L. Isachenko, S.S. Merezhkovskiy, M.D. Grimm and G.S. Kulesha. By developing the ideas of L. Pasteur and I.I. Mechnikov they laid the foundation for the bacterial method for combating rodents in Russia.

The development of and improvements in the bacterial method for combating rodents were promoted by N.F. Gamaleya, A.I. Antonovskiy, P.A. Bogdanov, M.P. Golubeva, Ye.F. Rozenfel'd, M.I. Prokhorov and others.

B. L. Isachenko and S.S. Merezhkovskiy isolated unique species of microorganisms -- bacteria from a salmonella group considered to be pathogenic for rodents and dangerous for both man and useful animals. Work was carried out in the laboratory with other groups of bacteria and yet, as more experiments were carried out and further data accumulated, attention was focused only on three species of bacteria: Danich, Merezhkovskiy and Isachenko. A spectrum for their pathogenic action against rodents was established, a study was undertaken of the safety aspects for man and useful animals, methods were developed for the production and use of liquid bacterial cultures and studies were undertaken on certain aspects of rodent immunity to these cultures, on the contagiousness and variability of the bacteria and on a number of other problems.

During the post-war period, the collective at the laboratory, under the direction of Professor M.I. Prokhorov, carried out a number of important studies on the creation of new forms of a bacterial preparation. A technology was developed for its production in a medium of a granulated structure (cereal grains, bone filings, fibrin, peas, corn, potatoes and so forth). This made it possible to expand the production volume considerably and also the use of the rodenticide preparation, known as bacterial rodenticide.

In 1956, studies were begun at the laboratory on a microbiological method for combating insects. An independent laboratory was organized in 1966. From the very beginning, energetic measures were undertaken in this laboratory aimed at finding new entomopathogenic microorganisms (fungi bacteria). Expeditionary studies carried out in the north Caucasus, the Crimea and in the southern Ukraine and so forth, made it possible to isolate a tremendous number of entomopathogens. Their characteristics were studied and, based upon the selected exotoxinogenic 202 Bacillus thuringiensis var. thuringiensis strain, the new entomocidic preparation bitoxibacillin (BTB-202) was created, which contains in its structure three entomocidic components: spores, crystalline endotoxin and heat-proof exotoxin; this expands the spectrum considerably and intensifies its entomocidic action. Jointly with the plants of Glavmikrobnoprom, the laboratory developed the technical conditions and a technological regulation for the production and use of the BTB-202 preparation.

During the 1978-1979 period, more than 500 tons of this preparation were produced -- effective for combating the Colorado beetle, cutworms and other harmful insects.

In 1969, two independent laboratories of the institute: bacterial method for combating rodents and the microbiology of insects were combined into one -- microbiology and pathology of rodents and insects. Improvements are being carried out in the combined laboratory in the production and use of bacterial rodenticide and bitoxibacillin. The new technology created for producing grain, amino-bone and mixed (grain and bone filings) bacterial rodenticide makes it possible to obtain a high quality preparation and it excludes phagolysis and contamination by foreign microflora. Studies were launched on the immunity of rodents and insects to bacterial infections, according to the contagiousness of the bacteria-producers of bacterial rodenticide and BTB-202, the questions concerned with epizootology, the preservation and variability of the pathogen-producers of the preparations in a natural medium and the mechanism for direct and metatoxic effect of the pathogens and their metabolites on rodents and insects. All of these studies were aimed at improving the means for employing the bacterial method for combating rodents and insects and raising its effectiveness.

During the Tenth Five-Year Plan, the search for new microorganisms and their metabolites, with repellent, anti-feedant, teratogenic and pseudohormonal effect on rodents and insects, occupied a significant place in the work of the laboratory.

A number of microorganisms having these properties have been isolated. Thus an actinomyces strain was selected and specimens of a dry preparation having an anti-feedant and entomocide effect on the larvae and imago of the Colorado beetle were prepared. Specimens of a new preparation were prepared from the Vas. thuringiensis var. israilensis -- effective against the larvae of mosquitoes and black flies in water areas.

Within the laboratory, a great amount of attention is being given to the introduction of scientific achievements into agricultural production. The results of this work is the extensive use of bacterial rodenticide and bitoxibacillin. During the past decade, the volume of use of bacterial rodenticide increased greatly and it is now being applied to 2-3 million hectares of agricultural land annually, to 5-8 million square meters of hothouse and hot-bed space and livestock husbandry facilities and bitoxibacillin -- to approximately 300,000 hectares. The use of these preparations is producing an economic savings of 10-15 million rubles, every year.

The laboratory made a considerable contribution towards the development of the microbiological method for combating rodents and insects and is a leading authority in this field. It is sufficient to state that of all of the microbe preparations in use throughout the country at the present time, 75 percent were created here. Preliminary tests are being carried out on new preparations.

In addition to work of an applied nature, a number of theoretical works were also carried out at the laboratory. Professor S.S. Merezhkovskiy developed the theoretical principles for preserving the virulence of the typhoid bacteria for rodents; Professor M.I. Prokhorov -- theoretical basis for the advisability of using a granulated structure in the production of rodenticide; Professor N.V. Kandybin -- theoretical prerequisites for the purposeful search for and selection of entomo and rodent-pathogenic microorganisms and the theoretical principles for the rational use of bacterial rodenticide and bitoxibacillin, taking into account the biological characteristics of the pathogens and their hosts. All of this provided the foundation for arranging and developing the applied studies of the laboratory and their successful introduction into production operations.

The laboratory maintains close contacts with many scientific and production institutes throughout our country. Its workers participate constantly in the organization and conduct of seminars on the problems associated with the bacteriological method for combating rodents and insects and they deliver lectures at the USSR VDNKh [Exhibition of Achievements of the National Economy of the USSR] and conduct courses aimed at improving the skills of agricultural specialists. All of the institutes engaged in producing bacterial rodenticide and BTB-202 are constantly being supplied with active strains of the bacteria (we are annually shipping approximately 500 packages containing strains and methodological aids). For their work in developing the technology for the production and use of bacterial rodenticide and BTB-202, the laboratory's workers were awarded two silver and 12 bronze medals of the USSR VDNKh and also honorary certificates and diplomas. Work is being carried out at the laboratory in connection with the training of scientific personnel through post-graduate work.

Our collective is actively participating in the socialist competition and, based upon the 1979 results, it won first place within the institute. This year, in competing to worthily prepare for the 26th CPSU Congress, we are once again devoting a maximum amount of effort towards achieving victory in the competition.

Fruitful studies in the field of plant protection are also being carried out by other subunits of the institute, such as the Laboratory for the Physiology and Ecology of Soil Microorganisms, headed by VASKhNIL [All-Union Academy of Agricultural Sciences imeni V.I. Lenin] Academician G.S. Muromtsev; the Laboratory for Technical Microbiology, directed by A.V. Khetyanovich; the Laboratory for Microbiology of Pesticides, headed by Y.V. Kruglov.

At the institute, great importance is being attached to studying the effect of systematic use of pesticides on soil fertility and to developing methods for controlling the microbiological processes concerned with the self-cleansins of soil of pesticides. Methods were revealed for the destruction of triazine herbicides by soil microorganisms and means were developed for accelerating their detoxication.

Studies of the mechanism underlying the effect of derivatives of simm-triazines and certain phenoxyalkylcarbonic acids on the interrelationships of rhizobiums with pulse plants made it possible to recommend a number of herbicides and a technology for their use with pulse crops, in combination with peat nitragin.

As a result of joint studies carried out over a period of many years by the institute and the Stepnoishimskiy Experimental Station of VNIIZKh [All-Union Scientific Research Institute of the Grain Economy], a soil-microbiological justification was furnished for anti-erosion processing of soil in northern Kazakhstan and this made it possible to partially replace a portion of the processing through the application of herbicides, after converting this complex into an effective means for protecting the soil against wind erosion and for obtaining stable yields.

A number of microbiological methods were also developed at the institute for determining the degree of environmental pollution caused by pesticides.

During this modern stage, the scientific potential of the institute makes it possible to solve very important problems of a fundamental and applied nature, problems aimed at developing highly effective microbiological means for protecting plants.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

UDC 632.95

ENVIRONMENTAL PROTECTION AGAINST HARMFUL CHEMICAL COMPOUNDS DISCUSSED

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 58-59

[Article by O.A. Skarlato, director of Zoological Institute of USSR Academy of Sciences and E.I. Slepyan, senior scientific worker: "Chemical Compounds and Protection of the Environment"]

[Text] Among the large-scale and many-sided problems associated with scientific-technical progress and particularly with the intensification of agriculture and forest husbandry and their conversion over to an industrial basis, one of the most complicated is that of protecting the agricultural crops and forest plantings. Chemical compounds and the preparations created on their basis are extremely complex and in the majority of instances are impossible to localize at those points where they are used directly. Air currents, water run-off, food chains and many other natural factors promote their moving about. Upon coming into contact with agricultural land and the ecological system of wild nature, they bring about unpremeditated disturbances.

The use of chemical agents in agriculture and forest husbandry is steadily increasing in terms of both volume and variety. Fertilizers (especially nitrogen fertilizers) and pesticides continue to be of the greatest importance. In conformity with the forecast for the development of the means of production and the productive forces in agriculture, pesticides in the future will continue to play a predominant role with regard to raising the productivity of crops under cultivation and domestic animals, for the next few decades.

At the present time, there are approximately 55,000 anthropogenic chemical compounds in our natural environment, of which number pesticides account for 0.9 percent (N.N. Mel'nikov, 1979). Notwithstanding the considerable self-cleansing capability of organisms and natural mediums, chemical substances still accumulate in them when the regulations are not observed and, as a result, the food chains and ecological systems on the whole sustain damage. An urgent need has developed for introducing a new ethic -- ecological -- into the consciousness of people. Pesticides must not be "elixirs of death" affecting the fate of our planet's living cover. Rather, they must retain their importance as aids to man in the campaign to protect crops and health.

National measures are being carried out throughout the USSR aimed at preventing pollution and cleansing the natural environment. However, the effect of chemical agents on natural ecological systems will increase if the strategy of their use is not ecologically sound or interrelated with appropriate nature-protecting measures. A conference on the subject "Chemical Agents in Agriculture and Forest Husbandry and the Protection of Nature", held in Leningrad in April of this year, was dedicated to discussing precisely this problem. The conference was organized by the Zoological Institute of the USSR Academy of Sciences, the Scientific Council for Environmental Problems of the Inter-departmental Coordination Council of the USSR Academy of Sciences in Leningrad, the Committee on Scientific Principles of Agriculture of the Presidium of the USSR Academy of Sciences and the Scientific-Technical Council of the Presidium of the Leningrad Oblast and Municipal Council of the All-Russian Society for the Protection of Nature.

The conference was opened by O.A. Skarlato (Zoological Institute of the USSR Academy of Sciences), who emphasized the complex nature of the problem and its urgency with regard to achieving further progress in agriculture and forest husbandry and for protecting the surrounding natural and municipal environment. O.A. Skarlato furnished information drawn from the history of use of fertilizers and pesticides and digital data on production growth and the scale of use for chemical preparations and he pointed out the well known means for limiting the undesirable consequences. In particular, the speaker attached special importance to avoiding the unpremeditated harmful effects of pesticides through the creation of selective low-toxicity preparations.

Six theme meetings were held during the conference. During the first meeting on the subject "Principal Scientific-Theoretical Problems On the Use of Chemical Agents in Agriculture and Forest Husbandry in Connection with the Overall Tasks for Protecting Nature," discussions were held on the reports delivered by E.I. Slepyan ("Chemical Agents in Agriculture and Forest Husbandry and the Problem of a Disruption in and the Restoration of Ecological Systems"), Ye.N. Mishustin, N.I. Cherepkov and Ye.M. Lebedev ("Intensification in the Use of Chemical Processes in Farming and Protection of Nature"), K.V. Novozhilov ("Strategy of Use of Pesticides in Agriculture and Protection of Nature"), I.V. Shutov ("Strategy of Use of Arboricides and Herbicides in Forest Husbandry and Protection of Nature") and Yu.V. Aleksayev ("Use of Fertilizers in Agriculture In Connection With the Tasks for Protecting Nature").

The reports examined the principal chemical agricultural and forest husbandry agents, the best methods for employing them, the most promising means for improving them by limiting and reducing their undesirable consequences, such as those which arise in the surrounding natural environment and an analysis was provided of the information on the unpremeditated disruptions which take place in organisms and natural ecological systems caused by these agents.

During a meeting on residual quantities of fertilizers and pesticides and their control, reports were delivered by Yu.M. Svirezhev and N.N. Timofeyev ("Mathematical Models for the Use of Chemical and Biological Control for the Optimum Operation of Ecological Systems"), A.S. Kashchenko ("Fertilization and the Protection of Soil As a Living Environment") and A.P. Zvirbul' ("Principles for Protecting Forest Soils During Fertilization and Liming Operations"). The authors of the reports, using mathematical models, attempt to describe the behavior of the pesticides and fertilizers, taking into account their effects and they cite information on the modern principles for protecting agricultural and forest soils against the undesirable products of transformed fertilizers and pesticides.

During a meeting on the subject "Use of Fertilizers and Pesticides and Protection of Soils, Natural Waters and Atmospheric Air," an analysis was conducted on the reports delivered by Yu.I. Khodakov ("Use of Fertilizers and Pesticides and Protection of Municipal Environment"), L.A. Lesnikov ("Fertilizers, Pesticides and Protection of Natural Waters"), A.V. Voyevodin ("Fertilizers and Pesticides in Agriculture and Protection of the Environment"), A.A. Martin ("Utilization and Decontamination of the Waste Products of Livestock Husbandry Complexes and the Protection of Nature"), A.P. Kozhemyakov and A.I. Chunderova ("Effect of Fertilizers and Pesticides on the Biological Fixation of Atmospheric Nitrogen"). A most important aspect of the mentioned reports is the prevention of air, water and soil contamination and also contamination of the municipal environment, caused by fertilizers and pesticides. Special attention was given to the use, in the form of fertilizer and protein feed, of the waste products of livestock husbandry complexes and also to eliminating the suppression of the processes of molecular fixation of atmospheric nitrogen.

The subject of the fourth meeting -- "PDK [maximum permissible concentration] of fertilizers and pesticides and Control Over Them." In the reports by T.Sh. Sharmanov and Sh.A. Bakanov ("Contamination of Food Products and Feed of Animal and Plant Origin By Fertilizers and Pesticides and Methods for Decontaminating Them"), L.M. Shabad, A.P. Il'nitskiy and N.L. Vlasenko ("The Possibility of Synthesizing Carcinogenic Nitroso Compounds in the Environment and Organism Using Fertilizers and Pesticides"), G.B. Pliss and M.A. Zabezhinskiy ("Potential Consequences of the Effects of Fertilizers and Pesticides on Animal Organisms") and L.G. Solenova and V.D. Davydov ("Possibility of Utilizing Waste Waters Containing Carcinogenic Hydrocarbons As Fertilizer in Agriculture"), data was furnished on the formation of nitroso compounds marked by carcinogenic and teratogenic activity owing to the presence of nitrates, nitrites and amines and on the residues of pesticides, fertilizers and their metabolites in food products and feed. In addition, the prospects for utilizing waste waters containing benzpyrene and other polycyclic aromatic hydrocarbons were evaluated. In all of the reports, attention was focused on rational methods for controlling contamination of the natural environment, agricultural plants, animals and products.

During the 5th meeting, the theme of which was "Self-purification of Organisms and the Environment of Residual Amounts of Fertilizer and Pesticides and the Possibility of Regulating It," reports were delivered by M.S. Sokolov ("Criteria for Evaluating Pollutants and the Self-purification Capability of Soils and Landscapes of the Residual Amounts of Pesticides"), Yu.V. Kruglov ("Microbiological Degradation of Pesticides and the Protection of Nature"), D.I. Chkanikov ("Degradation of Pesticides in Plants and the Problems of Analyzing Their Residues") and V.I. Rozengart ("Self-purification of an Animal Organism of Pesticides and the Possibility of Controlling It"). These reports provided an analysis of the modern views concerning the natural processes of decay in pesticides, occurring in natural mediums and organisms.

The theme of the 6th and final meeting was "Chemical Monitoring and Protection of Nature." Here discussions were held on the reports delivered by F.Ya. Rovinskiy and M.I. Afanas'yev ("Principles of Chemical Monitoring and Protection of Nature"), P.A. Vaganov and I.V. Shtangeyeva ("Instrument Methods for Chemical Monitoring"), and K.I. Pashkevich, V.Ye. Kirichenko and G.S. Kulikova ("Means and Methods for Determining the Residual Amounts of Urea From Fertilizers and Pesticides -- Derivatives of Urea"). The reports provided a review of the place occupied by chemical monitoring in the overall cycle of studies undertaken in the USSR in the field of monitoring, its specifics and also the possibility of employing neutron-activated, atomic-absorption, gas-chromatographic and other instrument methods for analyzing the residues of pesticides and fertilizers in the objects of an ecological system.

Tasks requiring solutions were defined during the conference and, as well, long-range trends for studies were formulated. This included the creation of selective low-toxicity preparations for use in agriculture and forest husbandry and the development and publicizing of more efficient and safe means for employing them; an analysis of the overall rules governing disruptions in and the restoration of ecological systems, brought on by the effects of chemical agents; a study of the dynamics of fertilizers and pesticides and the peculiarities of their transformation and spread in organisms and ecological systems, depending upon the geographic and ecological characteristics of a particular rural, forest or municipal environment; improvements in the methods used for the sanitary protection and cleansing of soils, natural waters and atmospheric air; improving the instrument-analytic and biological methods for controlling and the principles for establishing and refining the PDK for fertilizers (especially nitrogen fertilizers) and pesticides and the products of their transformations in ecological systems, organisms, feed, food goods and other objects of monitoring; the development of theoretical principles and practical methods for the artificial stimulation of self-purification in organisms and ecological systems; the exposure and study of types of organisms -- indicators of contamination of the surrounding natural environment by fertilizers and pesticides and the creation of experimental botanical and zoological models for the purpose of establishing the principles governing their genetic and epigenetic activity; an expansion in the number of studies associated with the methods employed for the rational use of industrial and domestic waste waters and waste products, for satisfying the requirements of landscaping and the agricultural, forestry and fishing economies without disrupting the natural ecological systems; a study of and the establishment of standards for the fertility of the principal types of soil, describing the agricultural lands and forest plantings so as to ensure their optimum use; an objective evaluation of the machines and mechanisms (including aviation) used in agriculture and forest husbandry, for the purpose of selecting those which will cause the least harm to the surrounding environment, agricultural lands and forest plantings and will be most safe as far as man is concerned.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

UDC 632.934

MEASURES FOR IMPROVING PRESERVATION OF PESTICIDES DISCUSSED

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 16-17

[Article by D.A. Lott, head of a laboratory at VNIPIagrokhim: "For Improving the Preservation of Pesticides"]

[Text] A greater amount of attention is being focused on those problems associated with the rational use of each kilogram of a preparation. The solving of such problems is greatly dependent upon the quality of the packaging employed and the technology used for warehouse processing and transporting the goods.

Many types of packaging possess a low mechanical durability and are subject to corrosion. This leads to losses in the preparations (nitraphen, chlorophos, magnesium chlorate, milled sulphur, TMTD [tetramethylthiuram disulfide], 2,4-D amino salt and others) during transport, loading and unloading operations and storage, to contact with chemically incompatible substances and it may even cause fires to break out.

Some preparations are still being supplied to agriculture in paper bags which lack polyethylene linings (milled sulphur, hexachlorane dust, triforin and others). Observations carried out over a number of years have shown that this type of packaging is completely unacceptable. It leads to losses in output, the contamination of warehouses, transport vehicles and the areas around bases and it brings about a deterioration in working conditions and an increase in the danger of fires breaking out in the storehouses. The use of polyethylene-lined paper bags for the packaging of pesticides also does not ensure the preservation of individual hygroscopic preparations, for example, magnesium chlorate.

The contact or mixing of scatterings of this chemical with combustible pesticides, due to disruption in the integrity of the packaging, can result in a self-heating or self-igniting of these materials taking place coincidental with the formation of the mixtures (with metaphos, carbophos, TMTD, phentiuram and others) and at times upon the expiration of an extended period of time (with propanide, keltane, phosalone and others). The latter is especially dangerous, in view of the fact that mixtures of magnesium chlorate with other preparations can be the cause of fires breaking out during those periods when personnel are not present in the warehouses and such a condition is fraught with serious consequences.

Unfortunately, such an important factor as the chemical neutrality of pesticides is not reflected in the standards nor in the technical conditions. Data on the chemical compatibility of the chemicals, particularly that associated with the explosion and fire-dangerous products used in agriculture (lacquers, paints, mineral fertilizers) which can result in especially dangerous situations, must be available at each packaging site. This will make it possible to position the products properly in a warehouse, prevent incidents of self-ignition of pesticides from taking place and it will ensure safer working conditions.

A certain amount of packaging standardization has already taken place. For example, different types of preparations are being packaged in barrels: Kel'tane, 16 percent GKhTsG [hexachlorocyclo-hexane], polydophen, 2,4-D amino salt, butapon, propanid, butiphos and metaphos; in cardboard drums -- phentiuram wetting powders, chlorophos, zineb and others. However, the packaging information strips are placed on the sides of the packages and only on the one side. Thus the strips may not be visible during storage. Quite often, during storage, the marking (especially in the case of metal packaging) is of such condition that it is impossible to determine even the name of the product. As a result, when being transported to the farms, a chemical having another type of action may accidentally become mixed with the required preparation and thus the latter may be used in an incorrect manner. In order to prevent the mixing of different groups of preparations, warning strips should ideally be placed around the entire circumference of a drum (barrel).

One reason for the incorrect use of pesticides is that changes take place in their physical properties. For example, as a result of observations carried out over a period of many years, it was revealed that different types of sediment appear on the bottom and walls of packaging in the case of a majority of emulsion concentrations, throughout the guarantee period for their storage (especially under conditions involving low winter temperatures). Subsequently, exfoliation or solidification of this sediment is observed. In the case of some (carbophos, benzophosphate), the presence of sediment does not affect the quality of the product and for others -- kel'tane, metaphos -- a substantial reduction in the product takes place. As a rule, the technical documentation for domestically produced preparations does not point out the probability of such phenomena occurring, nor does it provide recommendations for bringing the preparations to their initial state. Foreign suppliers of liquid forms of pesticides (metatione, BI-58, zolone, ordrama, tillama, surkopura and others), in addition to pointing out the optimum temperature regimes for storage, also recommend specific measures for achieving homogeneous emulsions: mixing, rolling of barrels for a definite period of time, maintenance under normal conditions prior to use. These recommendations are included in the markings for each packaging site. The introduction of such measures into the technical conditions, standards and markings for domestically produced preparations, the physical condition of which may change during storage, will make it possible to raise the effectiveness of use of pesticides and eliminate incidents involving the rejection or destruction of pesticides.

One indicator of the suitability of preparations is the stability of concentrated emulsions, which changes considerably during storage in excess of the guarantee period. The methods and principal parameters for determining this stability (time of exfoliation of the emulsion or sediment accumulation, amount of settled oil layer or accumulated sediment) are furnished in the technical conditions and standards. However, when determining quality, these data quite often do not conform with the GOST [state standard] and TU [technical conditions] requirements:

instead of a definite amount of oily layer, it is possible that a curdling or cream forming layer will develop, which will not be an indicator for rejection and yet its presence will cast doubt upon the stability of the emulsion and preclude the possibility of the preparation being recommended for further use.

Unfortunately, the extent of the deviations under which it is still permissible to use the product and the additional measures for preventing rapid exfoliation of the working liquids are lacking in the technical documentation. Only the TU for polydophen permit use of the preparation in the presence of more than 0.3 milliliters of sediment, provided it did not fall following threefold and mild inverting and settling over a period of 15 minutes. Such additions for all of the emulsions would make it possible to resolve the fate of the preparations in a more objective manner, while controlling their quality. Standardization of the method employed for determining the stability of the working solutions is also required. The process of preparing a working emulsion for each preparation varies (for metaphos, carbophos, kel'tane and polychlorpinen, distilled water is used, for phthalophos, benzophosphate and others -- water of a definite hardness; sedimentation tanks which differ in volume -- for polychlorpinen and metaphos -- 500 ml, for phthalophos, benzophosphate -- 100 ml, kel'tane -- measuring cylinder), although the principle for making a determination is one and the same (from the batch a water emulsion is prepared, which is held in suspension for a certain amount of time, after which a determination is made as to the volume of the sediment, "cream" or "oil" that was separated out. The amount of time required for determining stability varies (6-18 hours) and thus under production conditions it is recommended that the working emulsions be used for 4-5 hours following preparation. Thus the exposition of a laboratory definition for stability must be corrected. Our experiments revealed that the optimum time for awaiting the accumulation of sediment, for all of the emulsion concentrates, was 4 hours. If during this period of time, a clearly expressed sediment, oily layer and so forth did not form, then the emulsion can be considered stable.

At the present time, the standards for preparations produced by domestic industry call for quality control to be carried out upon the expiration of their guaranteed period of storage, but no recommendations exist with regard to the use of those preparations the active agent content of which has become less than the norm, a development which is often observed in actual practice. Can they be employed with a corresponding increase in the expenditure norm and if there is a reduction in the active agent content can the product be considered as suitable for use?

The studies carried out revealed that preparations having a lowered content of active agent can be used if their toxicity conforms to the toxicity of the standard, determined under laboratory conditions, and if phytocidity is not observed (ZASHCHITA RASTENIY [Protection of Plants], 1979, No. 7).

Solutions for the problems enumerated, in addition to promoting a reduction in quantitative and qualitative losses of valuable chemical products, will also make it possible to lower considerably the level of environmental contamination, during the "plant-field" stage, by toxic and dangerous substances, and reduce the amount of pesticides subject to burial and destruction.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

PLANT PATHOLOGY

UDC 632.937.14/.15

DEVELOPMENT OF EFFECTIVE MEASURES FOR COMBATING COTTON WILT

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 pp 35-36

[Article by G.S. Muromtsev, Academician at VASKhNIL and head of the Laboratory for Physiology and Ecology of Soil Microorganisms: "Microbiological Aspects of the Campaign Against Cotton Wilt"]

[Text] Verticillium cotton wilt continues to be a serious obstacle in the path of achieving further improvements in the cropping power of this valuable agricultural crop. In view of the fact that the causative agent for the Verticillium dahliae disease is a soil-inhabiting pathogen, the development of measures for combating it should ideally include means and methods of soil microbiology.

An effective means for waging such a campaign is that of creating conditions in the soil which will inhibit the development of the fungus and promote the activation of its competitors. This can be achieved using various agrotechnical methods (special soil cultivation, applying of particular fertilizers, crop rotation plans and so forth). But in order to evaluate correctly the effectiveness of a particular agricultural method, one must learn how to monitor the phytopathogen in its natural habitat -- the soil. The usual methods for estimating the number of microorganisms -- through placement on dense culture mediums -- are not very appropriate here. Not to mention the fact that this method is not suitable for a quantitative estimate of the mycelium forms and in the given case we do not know from which morphological form the agar colony developed -- a scrap of mycelium, conidium or microsclerotium. And this is very important: if mycelia are found in the soil, then the fungus functions in an active manner; however, if spores or sclerotium are found there -- then the situation is just the opposite. Thus extreme importance is attached to learning how to observe the pathogen in its natural habitat and to studying its ecology.

Towards this end, we employed a method based upon applying the fungus to soil in so-called combination membrane chambers. In the process, the culture in a drop of water was applied to the synthetic membrane (for example, Sinpor type), which was turned over in the glass cloth. The chamber was secured in a detachable diapositive frame and inserted in the soil. Following a definite interval of time, required by the researcher, the chamber was withdrawn from the soil, cleaned, fixed and stained in the required manner and thereafter the condition of the phytopathogen was studied under a microscope. The high permeability of the chambers ensures the rapid contact of the fungus with the soil and the effect of natural conditions on it. Of equal importance is the fact that it can be applied in the form of a mycelium, conidium or microsclerotium and their fate traced in the soil. Fixed chambers are well preserved and this also facilitates the work. By placing them in different types of soil, the rhizosphere for diverse plants, against different agricultural backgrounds and so forth, it is possible to observe directly the reaction of the causative agent to these conditions.

What results were achieved during the past few years using this particular method?

Workers attached to our laboratory (T.M. Lagutina, I.I. Chernyayeva and others), operating in close contact with specialists of SoyuzNIKhI [All-Union Scientific Research Institute of Cotton Growing] and SANIIZR, revealed that V. dahliae perished rather rapidly if it entered the soil in the form of mycelium or conidium. However, microsclerotium often germinates (although to a far weaker degree than in a damp chamber under laboratory conditions), forming individual mycelium threads. If these hypha reach the roots of cotton plants, they may enter them and cause infection. On the other hand, the newly formed mycelium is capable of once again producing microsclerotium. They are distinguished from those applied (obtained in the laboratory) by the fact that they are considerably smaller and have the correct oval shape. Thus it was confirmed experimentally that microsclerotium is more stable and, consequently, is a more dangerous form of the pathogen. Once introduced into the soil in this form, it can pass through a definite, although limited, cycle of development outside the roots of the plants. The results of these studies have provided the foundation for creating the biopreparation vertox (used for creating artificial infectious backgrounds for the breeding of cotton for wilt resistance) based mainly upon microsclerotium and not upon conidium or mycelium.

The method of combined membrane chambers was used successfully for responding to a question considered to be of great importance from both a theoretical and practical standpoint -- on the nature of the antagonistic interrelationships of microorganisms in the soil. It is generally known that microbe antagonism is an important factor affecting the fate of a phytopathogen in the soil. However, the generally accepted microbiological methods, those based mainly upon observance of the interrelationships of microorganisms in dense culture mediums, do not respond to the established task. As already mentioned, the conditions for the development of clean crops in artificial culture mediums are far from those found in soil and, based upon the revealed antagonism, substantial amounts of antibiotics formed by microbes in rich mediums are usually found in the nutrient agar. It has been some time since the opinion was expressed that the microbe-antagonists in culture mediums are not necessarily the same as those found in soil or conversely. However, it proved to be very difficult to carry out a check experimentally on the fairness of this assumption. And here we were assisted by the method of membrane chambers. The decision was made to place not just one but rather two microscopic fungi in the chamber. This made it possible to trace their interrelationships under true soil conditions. Towards this end, a special method was developed in our laboratory by G.A. Globus: microsclerotium V. dahliae was applied to one side of the membrane and on the other (strictly opposite the first) -- a suspension of spores from various saprophyte soil fungi. As usual, such a membrane filter became a glass cloth and thereafter it was placed in a detachable dispositive frame and inserted in the soil. Subsequent microscopic analysis of the withdrawn chambers made it possible to evaluate the development of each of the two fungi: the character and intensity of propagation of microsclerotium V. dahliae, the propagation percentage for the spores of the saprophyte fungi and the intensity of growth of their mycelium. The experiments revealed no correlation whatsoever -- neither positive nor negative -- between the antagonism of the fungi in the nutrient agar or in the soil. The development of the phytopathogen in the soil (propagation of the microsclerotium and growth of the hypha) became more weak as the fungus-saprophyte on the other side of the membrane grew stronger. Such a phenomenon is easy to explain on the basis of competition for the nutrients, which are incomparably less in the soil than in the generally accepted culture mediums. It is possible that some of the saprophyte fungi were able to develop by means of the nutrients which diffused out of the microsclerotium and that this conditioned the specific nature of the antagonism. Using this method, G.A. Globus revealed rather effectively (under real soil conditions) the antagonist V. dahliae of the Gliocladium genus.

It bears mentioning that use of the conventional light-optical microscope makes it quite easy to distinguish the hypha V. dahliae from the mycelium of other fungi, but only in those instances where they are combined with microsclerotium. It is very difficult to identify individual underlying threads and scraps of mycelium. A method was developed by O.K. Strunnikova for the specific immuno-fluorescent staining of the hypha of a pathogen on a membrane filter. Here only the hypha of V. dahliae (from a culture of the fungus, O.K. Strunnikova obtained whey of a high specificity) was stained in a selective manner. In this instance, the chamber was studied under a luminescent microscope.

For studying the microorganisms in membrane chambers, T.M. Lagutin employs a scanning electronic microscope, thus making it possible to study the interaction of the fungus with bacteria.

As is known, fungi, including phytopathogenic types, are aerobic organisms. Thus any factors which create an oxygen deficit in the soil inhibit their development. This principle can provide the basis for developing agrotechnical measures aimed at sanitizing the soil against fungus infections. Such agricultural measures should include minimal soil cultivation (particularly light-textured soils), the application of organic fertilizers, which bring about rapid propagation of saprophyte microflora and oxygen consumption, the application of restored forms of nitrogen fertilizers (urea, ammonia salts) and the exclusion of oxidized fertilizers (nitrates). The effect of nitrogen fertilizer forms on the infection of plants by soil-inhabiting phytopathogenic fungi was noted repeatedly in the case of verticillium wilt in a number of agricultural crops, root rot in cereal grains, potato scab and so forth. This question underwent intensive study in our laboratory, jointly with SoyuzNIKhI and SANIIZR. The works by I.I. Chernyayeva and F.Sh. Khasanova convincingly revealed that the reduced forms of nitrogen fertilizers can be an effective instrument for combating verticillium wilt in cotton. Applications of urea and ammonia salts weakened the infection considerably, whereas the use of nitrates intensified it. An interesting phenomenon was uncovered by I.I. Chernyayev during the course of interpreting the mechanism of this effect. It turned out that in addition to a direct change in the reduction-oxidation conditions in the soil, these fertilizers can furnish an indirect effect, by influencing the anti-fungus activity of a number of widespread soil bacter . It has been shown experimentally that, depending upon the form of the source of nitrogen, a sharp change takes place in the metabolism of the bacteria from a broad and widespread group of optional aerobes and anaerobes. In particular, in the presence of reduced forms of nitrogen, they form strong anti-fungus anti-biotics of a peptide nature and in mediums having nitrates they lose this capability. Thus, one method for increasing the effect of various forms of nitrogen fertilizers on the pathogenic microflora of soils can be that of their stimulation of the anti-fungus activity of soil bacteria.

Studies in this direction are being continued in our laboratory. They are being carried out in close contact with specialists from the cotton growing regions and it is our hope that the results of these joint endeavors will provide the basis for developing effective agrotechnical methods for combating cotton wilt.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

UDC 632.913.1

MEASURES FOR COMBATING AMERICAN WHITE MOTH REVIEWED

Moscow ZASHCHITA RASTENIY in Russian No 10, 1980 p 45

[Article by V.G. Nikitenko, chief of the Stavropol' Quarantine Inspection and N.Ya. Koneva, senior agronomist: "From Experience in Combating a Dangerous Pest"]

[Text] The American white moth was detected for the very first time in Stavropol'skiy Kray in 1978. A quarantine was imposed in those regions where the pest was observed and immediately thereafter a program of work was launched aimed at eliminating this pest. The kray administrations for the rural, forestry and municipal economies and for the construction and operation of highways published orders and developed and delivered plans to all of the farms calling for inspection and protective measures to be undertaken. In the spring of 1979, five series of seminars were conducted for the purpose of acquainting the specialists with the methods to be employed for exposing the pest and for understanding its morphology and biology and the methods to be employed for combating it.

We received fine assistance from the local press and radio facilities. The kray newspaper STAVROPOL'SKAYA PRAVDA [Stavropol' Truth] and radio issued daily critical-information reports during the summer on the inspections and measures being carried out against the moth. Two placards, three brochures and one warning were circulated on a massive scale. Forty five lectures were delivered and 470 discussions held.

A headquarters for the campaign being waged against the pest was established in the kray. It was headed by the 1st deputy chairman of the Kray Executive Committee G.G. Starshikov and by the deputy chief of the Production Administration for Agriculture of the Kray Executive Committee V.G. Bessonov.

The kray's territory was divided into three zones according to the density of colonization by the American white moth: a zone of extensive spread, where the pest was observed at a majority of the populated points and farms (Izobil'nenskiy Rayon); zone of partial spread, where only individual concentrations of the pest were exposed and a protected zone, where the moth was not observed. In conformity with a decision handed down by the Kray Executive Committee, the kray mechanized detachment for plant protection served as the basis for creating a special expedition for combating quarantine objects; this expedition was equipped with special OG-53 vehicles, motor vehicles with sides and OVT-1 sprayers with hoses. Insecticide reserves were created.

The hot and dry weather experienced during the second half of spring and during the summer promoted the accelerated development of the pest. The mass flight of the 1st generation imago had already commenced by 15 May and continued for 26 days, the egg laying and hatching of the caterpillars commenced on 17 and 25 May respectively, the mass appearance of caterpillars of the 3d and 4th age groups and the formation of nests began on 10 June and the pupation period commenced on 15 June. The flight was prolonged and the 1st generation caterpillars appeared within 60 days. The 2d generation moths appeared on 27 June, mass egg laying was observed taking place on 5 July, the hatching of the caterpillars began on 15 July, the mass appearance of caterpillars of the 3d and 4th age groups and the formation of nests occurred on 19 July, the pupation stage commenced on 11 August and mass pupation -- on 5 September. Second generation caterpillars were observed over a period of 60-75 days. The overall duration of their feeding period was 120-135 days.

Radio and telephone reports were issued to the farms, organizations and departments concerning the commencement of the inspections and treatment work. The inspections were carried out by quarantine and plant protection specialists, by workers attached to kolkhozes, sovkhozes, municipal economy, road administrations, sectors of railroad branches, forestry farms and scientific institutes, by deputies of rural soviets and by the members of street committees, pensioners, students, pupils (approximately 2,000 individuals).

The first inspection was carried out from 25 May to 19 July (the development of the first generation of the pest on perennial plantings) at populated points, on private plots, collective orchards, roadside plantings, parks and so forth. At the same time, nests containing the caterpillars were cut down and burned and the pest was also destroyed using insecticides. The second inspection was carried out from 20 July to 20 September (development of the second generation). Using the forces and resources of the farms, an inspection was carried out on 231,000 hectares, including 3,900 hectares of mulberry tree plantings, 71,000 hectares of plantings alongside highways and railroads, 103,000 hectares of forest strips, 46,600 hectares of collective orchards and 77,273 private plots (6,300 hectares); 4,700 hectares were inspected using state budgetary funds and 4,600 hectares were inspected by inspection specialists. New areas of concentration of the pest were discovered. It turned out that the moth inflicted the greatest amount of harm on mulberry trees and to a lesser degree -- on American maple, plum, apple, pear and cherry trees, lilac bushes and other trees and bushes.

By way of a preventive measure, the inspectors of the quarantine service and subunits of GAI [state automobile inspection] intensified their control over highways, railroad stations, airports and farms, with regard to the shipping of plant products from the contaminated zones. Prior to the sale of autumn and winter varieties of apples and other products, rules were composed for their procurement, transporting and sale during 1979-1980. These rules were made available to Krayplan [kray planning commission], the kray trade administration, kraypotrebsoyuz [kray union of consumers' societies], ovoshchepromtorg, kraysel'khozupravleniye [kray agricultural administration], the "Plodoprom" and "Stavropol'vino" associations and to rayon organizations. During the autumn and winter period, constant control was exercised over the carrying out of the quarantine rules at fruit sovkhozes, railroad stations, procurement organizations, markets and at branch communications offices for the shipping and sale of fresh fruit and planting stock.

The timely exposure of the dangerous pest made it possible to warn the population in good time and to undertake the necessary measures. As a result, all of the known concentrations of the pest were for all practical purposes destroyed: more than 6,000 nests containing caterpillars were cut down and burned, 5,700 hectares were treated with chlorophos, phozalone and sevin, including 3,000 hectares treated using farm resources, 1,400 hectares treated by agricultural aviation and 42 hectares treated by stazra [plant protection station] expeditions (OG-53 vehicles operated only at populated points). In those areas where the work was carried out either slowly or in a poor manner, the quarantine inspection specialists and also the stazra specialists informed the headquarters immediately.

The elimination of concentrations of this pest is continuing this year. Seminars have been conducted, the farms and population have been provided with literature on the quarantine regions, visual aids, chemicals, equipment, hoses, pruning shears and tree trimmers, a reserve of insecticides has been created and efficient observation of the periods for the appearance and development of the pest has been organized. In addition, a two-stage inspection of wooded areas throughout the entire area of the kray has been organized, involving the participation not only of quarantine and stazra specialists and farm workers, but also workers attached to scientific institutes and departments, students, pupils, pensioners. We are planning to intensify control over the shipping of products from the quarantine zones. In the event the pest is detected, measures will be undertaken to destroy it rapidly and completely.

COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita rasteniy", 1980
[509-7026]

7026
CSO: 1840

- END -

END OF

FICHE

DATE FILMED

Feb. 10 1981